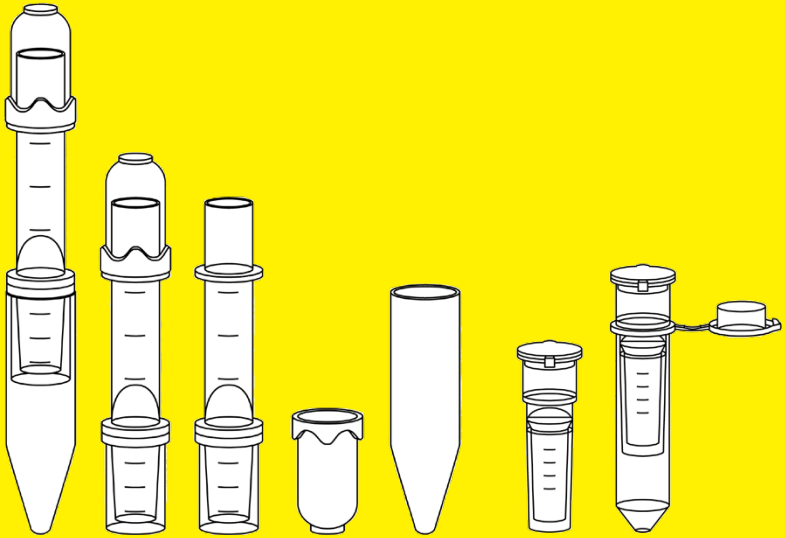
Instructions for Use

# Vivaspin® 500 and 2

Centrifugal Ultrafiltration Units for General Laboratory Use



3104647-001-00

SARTORIUS

# Contents

# 1 About these Instructions

## 1.1 Scope

These instructions are part of the product. These instructions apply to the following versions of the product:

| Vivaspin® 500 PES | Quantity | Prod. no. |
|---|---|---|
| 3 kDa | 25 \| 100 | VS0191 \| VS0192 |
| 5 kDa | 25 \| 100 | VS0111 \| VS0112 |
| 10 kDa | 25 \| 100 | VS0101 \| VS0102 |
| 30 kDa | 25 \| 100 | VS0121 \| VS0122 |
| 50 kDa | 25 \| 100 | VS0131 \| VS0132 |
| 100 kDa | 25 \| 100 | VS0141 \| VS0142 |
| 300 kDa | 25 \| 100 | VS0151 \| VS0152 |
| 1,000 kDa | 25 \| 100 | VS0161 \| VS0162 |
| 0.2 µm | 25 \| 100 | VS0171 \| VS0172 |

| Vivaspin® 2 PES | Quantity | Prod. no. |
|---|---|---|
| 3 kDa | 25 \| 100 | VS0291 \| VS0292 |
| 5 kDa | 25 \| 100 | VS0211 \| VS0212 |
| 10 kDa | 25 \| 100 | VS0201 \| VS0202 |
| 30 kDa | 25 \| 100 | VS0221 \| VS0222 |
| 50 kDa | 25 \| 100 | VS0231 \| VS0232 |
| 100 kDa | 25 \| 100 | VS0241 \| VS0242 |
| 300 kDa | 25 \| 100 | VS0251 \| VS0252 |
| 1,000 kDa | 25 \| 100 | VS0261 \| VS0262 |
| 0.2 µm | 25 \| 100 | VS0271 \| VS0272 |

| Vivaspin® 2 Cellulose Triacetate | Quantity | Prod. no. |
|---|---|---|
| 10 kDa | 25 \| 100 | VS02V1 \| VS02V2 |
| 20 kDa | 25 \| 100 | VS02X1 \| VS02X2 |

| Vivaspin® 2 Hydrosart® | Quantity | Prod. no. |
|---|---|---|
| 2 kDa | 25 \| 100 | VS02H91 \| VS02H92 |
| 5 kDa | 25 \| 100 | VS02H11 \| VS02H12 |
| 10 kDa | 25 \| 100 | VS02H01 \| VS02H02 |
| 30 kDa | 25 \| 100 | VS02H21 \| VS02H22 |

## 1.2 Target Groups

The instructions are designed for the following target groups. The target groups must possess the knowledge listed below.

| Target Group | Knowledge and Qualifications |
|---|---|
| Operator | The operator of the product is responsible for compliance with safety requirements and workplace safety regulations. The operator must ensure that anyone working with the product has access to the relevant information and is trained to work with the product. |

## 1.3 Symbols Used

### 1.3.1 Warnings in Operation Descriptions

**NOTICE**
Denotes a hazard that may result in property damage if it is **not** avoided.

### 1.3.2 Other Symbols

▶ Required action: Describes actions that must be carried out. The actions in the sequence must be carried out in succession.

▷ Result: Describes the result of the actions carried out.

# 2 Safety Instructions

## 2.1 General Functions

The product is intended for the ultrafiltration and | or diafiltration of biological and aqueous solutions. The sample solutions and volumes used must be suitable for the product.

The filtration process must be carried out in a centrifuge. Macromolecules that are sufficiently larger than the nominal pore size of the membrane are retained above the membrane and progressively concentrated. The vertical membrane inhibits membrane fouling while the built-in dead stop impedes concentration to dryness and loss of sample.

The product is supplied non-sterile. It is intended for single use and must be disposed of after one use.

The product is intended exclusively for use in accordance with these instructions. Any further use beyond this is considered improper.

### Operating Conditions for the Product

The product is intended for general laboratory use.

The product may only be used with the equipment and under the operating conditions described in the Technical Data section of these instructions.

## 2.2 Personnel Qualification

Persons without sufficient knowledge in the safe use of the device can injure themselves and others.

If a specific qualification is required for an activity: The target group is indicated. If no qualification is specified: The activity can be carried out by the target group “Operator”.

## 2.3 Significance of these Instructions

Failure to follow the instructions might have serious consequences, e.g. danger to individuals.

- ▶ Read the instructions carefully and completely. The instructions for action build on each other.
- ▶ Ensure that the information contained in these instructions is available to all individuals working with the product.

## 2.4 Functionality of the Product

A damaged product or worn parts can lead to malfunctions or cause hazards which are difficult to identify.

- ▶ Only operate the product when it is safe and in perfect working order.

# 3 Product Description

## 3.1 Vivaspin® 500

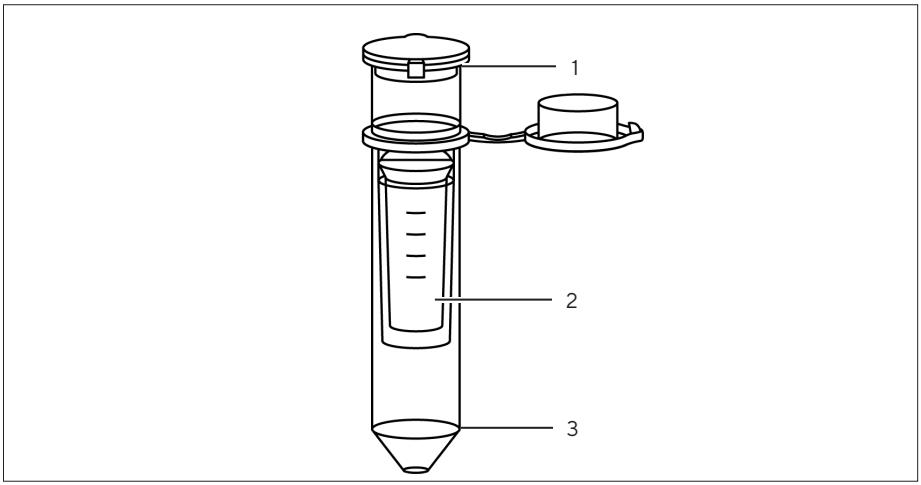



Fig. 1: Product overview (example)

| Pos. | Description |
|---|---|
| 1 | Concentrator |
| 2 | Membrane |
| 3 | Filtrate container |

## 3.2 Vivaspin® 2

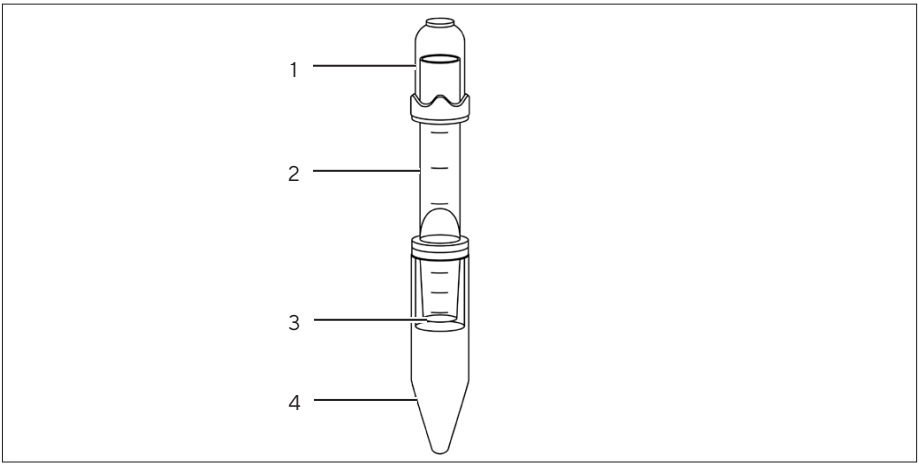



Fig. 2: Product overview (example)

| Pos. | Description |
|---|---|
| 1 | Concentrator cap |
| 2 | Concentrator |
| 3 | Membrane |
| 4 | Filtrate container |

## 3.3 Product Symbols

| Symbol | Definition |
|---|---|
| REF | Catalogue number |
| | Do not reuse |
| | Use by |
| LOT | Batch code |
| | Manufacturer |
| | Temperature limitation |
| NON STERILE | Non-sterile product |

# 4 Process Preparation

## 4.1 Scope of Delivery

| Article | Qty |
|---|---|
| Product packed in a cardboard box | |
| Vivaspin® 500 | 25 or 100 |
| Vivaspin® 2 | 25 or 100 |
| Instructions for Use | 1 |

## 4.2 Unpacking

**Procedure**

- ▶ **NOTICE** Risk of product malfunctions due to exceeding the usability! Check the usability of the product (see specification on packaging). Dispose of products for which the usability has been exceeded.
- ▶ Unpack the product.

# 5 Operation

## 5.1 Pre-Rinsing the Product

Membranes in the product may contain traces of glycerin. If this substance can interfere with the analysis of the sample: The membrane may be rinsed before filtration.

### Procedure

- ▶ Remove the concentrator cap.
- ▶ Use a pipette to apply a filling volume of buffer solution or deionized water into the concentrator.
- ▶ Replace the concentrator cap.
- ▶ Wash the buffer solution or deionized water through the membrane by centrifugation.
- ▶ Empty the concentrator and filtrate container.
- ▶ If the pre-rinsed product is not used immediately: Cover the surface of the membrane with buffer solution or water and store the product in the refrigerator. The membrane must not dry out.

## 5.2 Sanitizing the Product

The product can be sanitized before use. The sanitizing method must be suitable for the product (see Chapter "8.6 Sanitizing Methods," page 24).

### Procedure

- ▶ Remove the concentrator cap.
- ▶ Sanitize the product using the desired sanitizing method.
- ▶ Empty the product.

## 5.3 Applying the Sample

It is recommended that a pipette is used to apply the sample into the product. The pipette must be compatible with the product (see Chapter "8.5.1 Pipettes," page 23).

Please ensure that the molecular weight cut-off (MWCO) of the product is suitable for the size of the target molecule to be concentrated. In order to ensure maximum recovery of the target molecule, it is recommended to select a MWCO that is at least 50% below the size of the target molecule.

### NOTICE

**Risk of product malfunctions due to using unsuitable samples!**

- ▶ Only pour suitable samples into the product (see Chapter "10 Chemical Compatibility," page 27).

### NOTICE

**Risk of product malfunctions or damage to the centrifuge due to exceeding the maximum filling volume!**

- ▶ Do **not** exceed the maximum filling volume (see Chapter "8.4.1 Filtration Volumes," page 22).

Procedure

- ▶ Check whether the MWCO of the product is suitable for the application.
- ▶ Remove the concentrator cap.
- ▶ Apply the sample into the product using a pipette. Comply with the maximum filling volume.
- ▶ Replace the concentrator cap.

## 5.4 Inserting the Product into the Centrifuge

**Procedure**

- ▶ **NOTICE** Risk of product malfunctions or damage to the centrifuge! Only use the product in suitable centrifuges (see Chapter "8.5.2 Centrifuges," page 24).
- ▶ Insert the product into the centrifuge.
- ▶ If a centrifuge with fixed-angle rotor is used: Place the product into the centrifuge so that the printed volume graduations on the concentrator are facing upwards.

## 5.5 Performing Filtration

**Procedure**

- ▶ **NOTICE** Risk of product malfunctions or damage to the centrifuge. Comply with the approved centrifugation limit values (see Chapter "8.4.2 Centrifugation Limit Values," page 23).
- ▶ Centrifuge the product in the centrifuge until the desired concentration level is achieved.

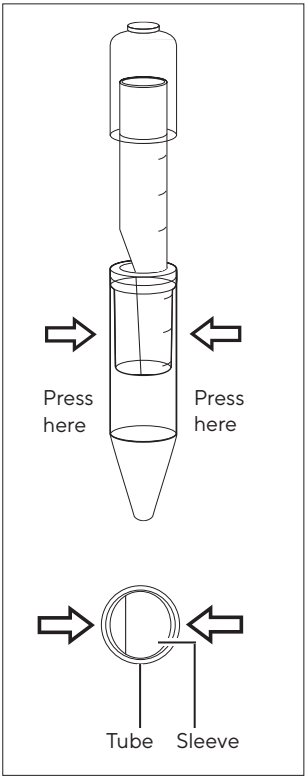
## 5.6 Removing the Sample

**Procedure**

- ▶ If the filtration or concentration is complete: Remove the product from the centrifuge.
- ▶ Remove the concentrator cap.
- ▶ Recover the sample from dead stop pocket of the concentrator using a pipette.
- ▶ If the membrane was pre-rinsed before filtration: Decant the filtrate and concentrate.

## 5.7 Vivaspin® 2

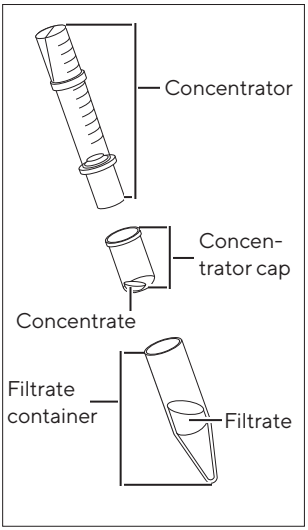
### 5.7.1 Removing the Concentrator from the Filtrate Container




**Procedure**

- To release the tube from the concentrator, pinch the tube – to press it into an oval shape – before removing it with a twisting action.

### 5.7.2 Reverse spin with Vivaspin® 2




The concentrate can be collected into the concentrator cap by reverse spinning, instead of using a pipette.

**Procedure**

- Remove filtrate container.
- With the concentrator cap still fitted, invert the concentrator.
- Insert concentrator cap into filtrate container.
- Insert the product into the centrifuge.
- If a centrifuge with fixed-angle rotor is used: Place the product into the centrifuge so that the printed volume graduations on the concentrator are facing upwards.
- Spin at up to 3,000 *g* for 2 minutes.

## 5.8 Desalting or Buffer Exchange

**Procedure**

- Concentrate the sample to the desired level.
- Remove the concentrator cap.
- Discard the filtrate.
- Refill the concentrator with an appropriate exchange buffer.
- Concentrate the sample again.
- Repeat the process until the original buffer and | or contaminating microsolute has been sufficiently removed.
- If the desalting or buffer exchange is complete: Recover the sample.

# 6 Storage

## 6.1 Storing the Product

If the product has been unpacked and membrane has been pre-rinsed: The membrane must be protected against drying out. For this purpose, the membrane must be stored in a moist and cool condition.

### NOTICE

**Risk of damage to the product due to improper storage!**

- ▶ Comply with the storage specifications.

Procedure

- ▶ If the product is packaged: Store the product in the packaging.
- ▶ If the product has been unpacked and the membrane has been pre-rinsed:
  - ▶ Remove the concentrator cap.
  - ▶ Cover the membrane with buffer solution or water.
  - ▶ Replace the concentrator cap.
- ▶ Store the product according to the ambient conditions (see Chapter "8.3 Ambient Conditions," page 22).

# 7 Disposal

## 7.1 Decontaminating the Product

If the product has come into contact with hazardous substances: Steps must be taken to ensure proper decontamination and declaration. The operator of the product is responsible for adhering to local government regulations on the proper decontamination and declaration for transport and disposal.

### Procedure

▶ If the product has come into contact with hazardous substances: Decontaminate the product.

## 7.2 Disposing of the Product

The product must be disposed of properly. The packaging is made of environmentally friendly materials that can be used as secondary raw materials.

### Requirements

The product must be decontaminated.

### Procedure

▶ Dispose of the product in accordance with local government regulations.
▶ Dispose of the packaging in accordance with local government regulations.

# 8 Technical Specifications

## 8.1 Dimensions

| | Vivaspin® 500 | | Vivaspin® 2 | |
|---|---|---|---|---|
| | **Unit** | **Value** | **Unit** | **Value** |
| Length x Diameter | mm | 50 x 11 | mm | 126 x 17 |
| Active membrane surface | $cm^2$ | 0.5 | $cm^2$ | 1.2 |
| Weight | g | 3 | g | 11 |

## 8.2 Materials

| | Vivaspin® 500 | Vivaspin® 2 |
|---|---|---|
| Concentrator | Polycarbonate | Polycarbonate |
| Filtrate container | Polypropylene | Polycarbonate |
| Membrane | Polyethersulfone | Polyethersulfone, Cellulose triacetate, Hydrosart® |

## 8.3 Ambient Conditions

| | Unit | Value |
|---|---|---|
| Storage temperature | | |
| When packed | °C | +15 – +30 |
| When unpacked, with membrane kept moist | °C | +2 – +8 |

## 8.4 Operating conditions

### 8.4.1 Filtration Volumes

| | | Centrifuge with swing bucket rotor | Centrifuge with fixed-angle rotor (25°) |
|---|---|---|---|
| | Unit | Value | Value |
| **Vivaspin® 500** | | | |
| Filling volume, maximum | µL | - | 500 |
| Membrane hold-up volume, minimum | µL | - | < 5 |
| Dead stop volume[1] | µL | - | 5 |
| **Vivaspin® 2** | | | |
| Filling volume, maximum | mL | 3 | 2 |
| Membrane hold-up volume, minimum | µL | < 10 | < 10 |
| Dead stop volume[1] | µL | 8 | 8 |

[1]The dead stop volume may vary depending on the type and concentration of the sample, operating temperature and | or centrifuge rotor

### 8.4.2 Centrifugation Limit Values

| | | Centrifuge with swing bucket rotor | Centrifuge with fixed angle rotor |
|---|---|---|---|
| | **Unit** | **Value** | **Value** |
| Vivaspin® 500 | *g* | - | 12,000 |
| Vivaspin® 2 | *g* | 4,000 | 8,000 |

## 8.5 Equipment Required

### 8.5.1 Pipettes

Pasteur pipette, variable volume or fixed volume pipette for sample application and concentrate or filtrate retrieval.

### 8.5.2 Centrifuges

Centrifuge accepting conical base tubes.

| | Required carriers | |
|---|---|---|
| | **Unit** | **Value** |
| **Vivaspin® 500** | | |
| Rotor type | Fixed angle | |
| Volume | mL | 2.2 |
| Diameter | mm | 11 |
| Minimum rotor angle | ° | 40 |
| **Vivaspin® 2** | | |
| Rotor type | Swing bucket or fixed angle | |
| Volume | mL | 15 |
| Diameter | mm | 17 |
| Minimum rotor angle | ° | 25 |

## 8.6 Sanitizing Methods

| |
|---|
| Rinsing with 70% ethanol or with sanitizing gas mixture, e.g. ethylene oxide |
| **Not** suitable for autoclaving |

# 9 Typical Performance Characteristics

## 9.1 Vivaspin® 500

| | Time to concentrate up to 30x at 20°C | |
|---|---|---|
| **Start volume** | 500 µL | |
| | **Time (min)** | **Solute Recovery** |
| Aprotinin 0.25 mg/mL (6.5 kDa) | | |
| 3 kDa PES | 30 | 96% |
| BSA 1.0 mg/mL (66 kDa) | | |
| 5 kDa PES | 15 | 96% |
| 10 kDa PES | 5 | 96% |
| 30 kDa PES | 5 | 95% |
| IgG 0.25 mg/mL (160 kDa) | | |
| 30 kDa PES | 10 | 96% |
| 50 kDa PES | 10 | 96% |
| 100 kDa PES | 10 | 96% |

## 9.2 Vivaspin® 2

| | Time to concentrate up to 30x at 20°C | |
|---|---|---|
| **Start volume** | 2 mL | |
| | **Time (min)** | **Solute Recovery** |
| Insulin chain A 0.1 mg/mL (2.5 kDa) | | |
| 2 kDa Hydrosart® | 35 | 95% |
| Aprotinin 0.25 mg/mL (6.5 kDa) | | |
| 3 kDa PES | 50 | 96% |
| BSA 1.0 mg/mL (66 kDa) | | |
| 5 kDa PES | 12 | 98% |
| 5 kDa Hydrosart® | 22 | 98% |
| 10 kDa PES | 8 | 98% |
| 10 kDa CTA | 10 | 96% |
| 10 kDa Hydrosart® | 12 | 98% |
| 20 kDa CTA | 5 | 96% |
| 30 kDa PES | 8 | 97% |
| 30 kDa Hydrosart® | 5 | 97% |
| IgG 0.25 mg/mL (160 kDa) | | |
| 20 kDa CTA | 6 | 97% |
| 30 kDa PES | 10 | 96% |
| 50 kDa PES | 10 | 96% |
| 100 kDa PES | 8 | 95% |

# 10 Chemical Compatibility

Chemical, biological and aqueous solutions with appropriate compatibility for the materials of the product (2 hr contact time)

| **Solutions** | **PES** | **CTA** | **HY** |
|---|---|---|---|
| **Compatible pH range** | **pH 1–9** | **pH 4–8** | **pH 1–9** |
| Acetic Acid (25%) | OK | NO | OK |
| Acetone (10%) | NO | NO | NO |
| Acetonitrile (10%) | NO | NO | NO |
| Ammonium Hydroxide (5%) | ? | OK | OK |
| Ammonium Sulphate (saturated) | OK | ? | ? |
| Benzene (100%) | NO | NO | NO |
| n-Butanol (70%) | ? | NO | ? |
| Chloroform (1%) | NO | NO | NO |
| Dimethyl Formamide (10%) | ? | NO | NO |
| Dimethyl Sulfoxide (5%) | OK | NO | NO |
| Ethanol (70%) | OK | OK | OK |
| Ethyl Acetate (100%) | NO | NO | NO |
| Formaldehyde (30%) | OK | OK | OK |
| Formic Acid (5%) | OK | ? | OK |
| Glycerine (70%) | OK | OK | OK |
| Guanidine HCl (6 M) | OK | ? | OK |
| Hydrocarbons, aromatic | NO | NO | NO |
| Hydrocarbons, chlorinated | NO | NO | NO |
| Hydrochloric Acid (1 M) | OK | NO | OK |

| Chemical, biological and aqueous solutions with appropriate compatibility for the materials of the product (2 hr contact time) | | | |
|---|---|---|---|
| **Solutions** | **PES** | **CTA** | **HY** |
| **Compatible pH range** | **pH 1–9** | **pH 4–8** | **pH 1–9** |
| Imidazole (300 mM) | OK | NO | ? |
| Isopropanol (70%) | OK | OK | OK |
| Lactic Acid (5%) | OK | NO | OK |
| Mercaptoethanol (1 M) | NO | NO | OK |
| Methanol (60%) | ? | ? | OK |
| Nitric Acid (10%) | OK | NO | NO |
| Phenol (1%) | ? | ? | NO |
| Phosphate Buffer (1 M) | OK | OK | OK |
| Polyethylene Glycol (10%) | OK | ? | ? |
| Pyridine (100%) | NO | NO | NO |
| Sodium Carbonate (20%) | OK | NO | ? |
| Sodium Deoxycholate (5%) | OK | ? | ? |
| Sodium Dodecylsulfate (0.1 M) | OK | OK | OK |
| Sodium Hydroxide (2.5 M) | NO | NO | NO |
| Sodium Hypochlorite (200 ppm) | OK | NO | NO |
| Sodium Nitrate (1%) | OK | ? | OK |
| Sulfamic Acid (5%) | OK | NO | ? |
| Tetrahydrofuran (5%) | NO | NO | NO |
| Toluene (1%) | NO | NO | NO |
| Trifluoroacetic Acid (10%) | OK | NO | OK |
| Tween®* 20 (0.1%) | OK | OK | OK |

Chemical, biological and aqueous solutions with appropriate compatibility for the materials of the product (2 hr contact time)

| Solutions | PES | CTA | HY |
|---|---|---|---|
| **Compatible pH range** | **pH 1–9** | **pH 4–8** | **pH 1–9** |
| Triton®** X-100 (0.1%) | OK | OK | OK |
| Urea (8 M) | OK | ? | OK |

OK = Acceptable ? = Questionable NO = Not recommended
* Triton® is a registered trademark of Union Carbide Corp.
** Tween® is a registered trademark of ICI Americas Inc.

Sartorius Stedim Lab Ltd.
Sperry Way, Stonehouse
GL10 3UT, UK

Phone: +44 1453 821972
www.sartorius.com

The information and figures contained in these instructions correspond to the version date specified below.
Sartorius reserves the right to make changes to the technology, features, specifications and design of the equipment without notice.
Masculine or feminine forms are used to facilitate legibility in these instructions and always simultaneously denote all genders.



Last updated:
05 | 2023



KS | Publication No.: SLU6093-e230513